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FOREST MANAGEMENT GUIDE AND RECOMMENDATIONS

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FOREWORD

Surveys show that population is increasing in the United States with a corresponding increase in the use of wood. It has become apparent that State and Federal lands cannot be expected to produce enough forest products to meet projected demands.

Approximately 30% of the commercial forest land in Montana is in private ownership. Of this, forest industries own less than one-fourth. This means that more than 3.5 million acres are held by over 20,000 individual owners.

Most of these small private forest holdings are not under some form of management and many are in need of reforestation and improvement. These lands must be put into full forest production if our forest industry is to meet the predicted demand for wood products.

The Montana Legislature and the Division of Forestry recognize this problem and provide "Service Foresters" to assist you in improving, harvesting, and planning the management of your timber lands.

Under this assistance program, the Service Forester can help you interpret the more technical phases of forestry into practical management practices which you can apply to your woodlands. He can assist you in obtaining an extensive inventory, determine stand improvement practices and help you formulate a long range management plan for your forest. He can also advise you on harvest cutting, timber sale contract, logging plans and the protection of your forest from fire, insects, and disease.

The forestry assistance program is designed to show you how to do the work that will be to your best interests. The Service Forester cannot do the work for you, nor can he offer services that are normally provided by independent, private consulting forestry firms.

The "Service Forester" who gave you this booklet has assisted you in some phase of forest management. The information contained herein is to help you remember the information he provided. Specific recommendations have been recorded on page 13 in the back of this booklet.

THE MANAGEMENT PLAN

In a farming or ranching enterprise one of the objectives of the owner is to build and maintain the highest possible level of income from all lands in the unit.

Forest land should be managed as an integrated part of the ranch operation. Timber, like hay and grain, is a crop. Although income from timber may not be realized annually, a healthy, thrifty, well managed stand will add value to your land. Good management practices will reduce the time necessary to grow tree crops.

While the timber crop is growing, some products can be harvested from the forest which would eliminate a cash outlay for the commercial product. For instance, fence posts, corral rails and small poles can be removed in thinnings. Custom sawing will provide lumber for barns and other outbuildings. In some areas Christmas trees and firewood can provide an income to help defray taxes and protection costs.

A Montana Division of Forestry Service Forester can help you prepare a management plan which will determine the amount and kind of products you have and when you should expect to cut them. The plan also outlines management and improvement practices which will help meet your needs and objectives. In this way you can provide for the orderly development of a course of additional revenue to your farming or ranching enterprise.

SELECTION OF CROP TREES

Careful consideration should be given to the proper selection of crop and other leave trees in commercial and non-commercial thinnings. They are the most valuable trees on your land and the ones you will want to leave until they mature.

Crop trees are those which:

1. Are free from insects and disease.
2. Have vigorous growth and generally are taller and healthier than others in the stand.
3. Have a full crown with a single leader.
4. Have a straight trunk and are not leaning.
5. Are one of the more valuable species in the stand.

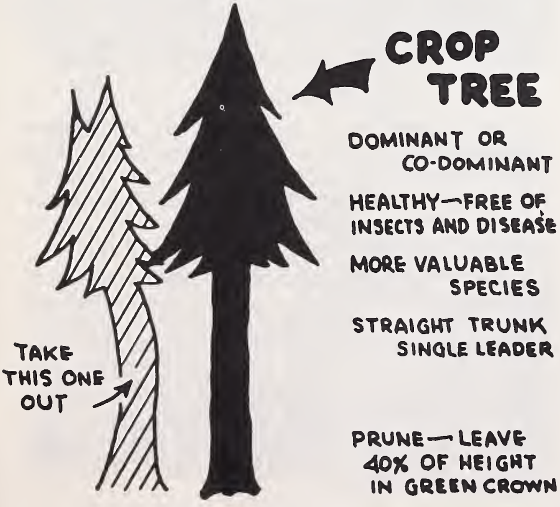
Trees which would otherwise qualify for crop trees should be removed if needed to provide adequate spacing.

Other Leave Trees: Forestland will support approximately 100 crop trees per acre to full maturity. One may start with as many as 1,000 trees/acre or more and through periodic commercial or non-commercial thinning, reach the desired number of crop trees. Thinning materials will furnish a source of revenue when removed as posts, poles, or small sawlogs. These trees should be selected so that they do not compete with your crop trees. They must also be free from insects or disease and should have as many more of the crop tree requirements as possible. They are generally the co-dominant trees in the stand.

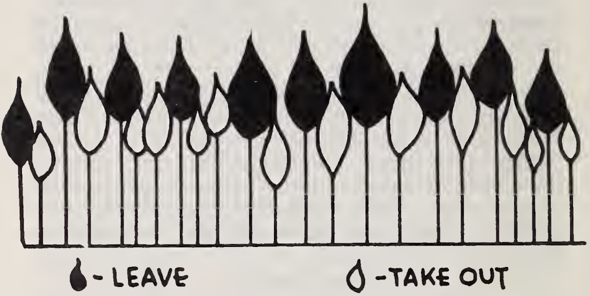
THINNING

The purpose of thinning is to reduce the time required to grow tree crops. Trees are much the same as other plants in that overcrowding results in a slower growth. By proper spacing you can produce marketable products much faster than in a crowded forest.

Thinning is needed when trees are growing so closely together that the branches in their crown join and intermingle. Using the guides outlined in crop tree selection, you should remove enough trees so that the remaining crowns do not quite touch. Refer to the recommendations the Service Forester has made in the back of this booklet for proper spacing of your stand.


CROP TREE
DOMINANT OR CO-DOMINANT
HEALTHY—FREE OF INSECTS AND DISEASE
MORE VALUABLE SPECIES
STRAIGHT TRUNK SINGLE LEADER
TAKE THIS ONE OUT
PRUNE—LEAVE 40% OF HEIGHT IN GREEN CROWN

THINNING



Slash Disposal: Green slash is a potential breeding ground for beetles that can attack and kill your crop and other leave trees. It is also a high fire hazard. For these reasons, slash disposal should be kept current with the thinning operation. Forest products should be removed as soon as practical.

If you have a heavy thinning it may be necessary to pile the slash in openings away from the standing trees and burn the piles when it is safe. You will find it advantageous to lop the branches of felled trees so the slash will be on the ground to speed disintegration. In all cases slash disposal around the edge of your woodlot and along roads is essential for protection against fire.

PRUNING

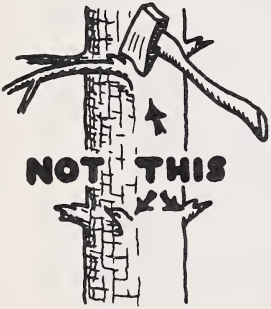
Logs which will produce clear lumber command a much higher price on the market than those which are knotty or have other defects. Pruning the lower branches from your crop trees will produce a higher quality product and a corresponding increase in value for the logs.

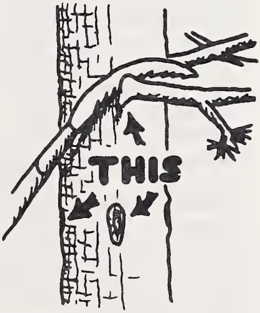
It has been determined that at least 6 inches of growth must be added to all sides of a pruned log before the increase in quality of lumber justifies the pruning operation. This is a diameter increase of 12 inches. Therefore, if you prune 6-inch trees in your stand you must plan to hold them until they are 18 inches. If you have 8-inch trees you should them until they are 20 inches, and so on. Prune only the size and species of tree recommended by the Service Forester.

Branches must be removed with a pruning saw for a smooth cut flush with the trunk. This will speed wood growth over the cut. Branches broken off or cut with an axe take many years to heal over and provide access for disease to enter the tree.

You should plan to produce at least one clear 17-foot log from your crop tree. With stump and trim allowance this means that you will need to prune to 18 feet from ground level.

Do not remove over 1/3 of the green crown when pruning. Removing more will reduce the growth rate and cancel out gains that are made through thinning. For maximum growth at least 40% of the total height should be retained in green crown. If your stand cannot be safely pruned to 18 feet at the present time, you should plan several prunings at intervals of 4 to 5 years. Refer to the Service Forester's recommendations for proper height and number of trees to prune in your stand.





RELEASE OF SEEDLINGS OR SAPLINGS

Thick stands of young reproduction tend to stagnate rapidly. Such stands grow slowly and generally will not produce merchantable products. Treatment should be undertaken at an early age, using guides outlined for thinning.

Generally dominant and co-dominant trees cannot be distinugished in young stands. For this reason, thinning can be done faster as spacing and species is the only consideration of the operation. Trees can be removed with an axe or brush hook.

REFORESTATION

Areas which have from 5 to 10 well-spaced seed trees per acre can generally be reforested naturally. Openings up to 20 acres may also be reforested if a seed source is present around the boundary of the area.

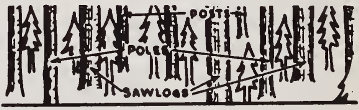
In order for tree seed to germinate and the new plant to become established it must come in contact with the mineral soil. Logging often tears up the ground surface enough to make this possible. However, you should scarify those areas which have a heavy cover of litter or brush. Generally this can be done with equipment you have on the ranch such as a tractor and harrow or disc. Areas which have heavy debris may require a dozer with brush rake attachment. Service Foresters will advise you on the best equipment and techniques to use.

Planting: Areas which have no seed source should be reforested by planting. Care should be taken to select species which are adapted to the site and are grown from local seed. Competing vegetation should be removed by scalping or furrowing to allow seedlings to become established. Select only those species recommended by the Service Forester.

Grazing: You should exclude livestock for at least 5 years from areas which have been restocked to trees. Fencing is generally recommended; the expense is justified in increased survival of the seedlings.

MARKETING

Refer to your management plan to determine areas which should be harvested. The plan will outline the method of cutting which should be used. Contact the Service Forester for help in determining cutting areas or the selection of individual trees.



Generally you will find several markets for your forest products. You should investigate all possibilities in order to secure the best price. Healthy standing green timber is not a perishable product and it may be good business to delay cutting until prices are more favorable. It is advantageous to invite several purchasers to inspect your stand and make an offer.

For highest returns from growing timber do as much of the logging as you can yourself. Generally, logging can be done at a time of the year which does not interfere with other ranch or farm operations. You probably already have much of the necessary equipment.

Contracts: Standing timber should always be sold by a written "Sale Agreement" to protect your investment in the land and timber. Make a personal investigation to select honest and reliable buyers. Check to see if their type of operation will suit your requirements. Sell to a firm that is well established, experienced and reliable.

The minimum requirements of a "Sale Agreement" should include the following:

1. Names and addresses of contracting parties.
2. Date and place contract is signed.
3. Guarantee of ownership of timber.
4. Location and description of property.
5. Description of timber to be sold, species, method of cutting, how marked.
6. The conditions of payment.
7. How, when and where the timber is to be measured. Unit of measure.
8. Cutting rules and regulations.
    a. Beginning and expiration date for cutting.
    b. Penalty clause for cutting or damage to unmarked timber.
    c. Liability for fire or property damage.
    d. Utilization requirements, stump height, top diameter, defect.
9. Road construction requirements.
10. Erosion control measures.
11. Slash disposal requirements. Who will pay. Fire lines.
12. A bond for faithful performance of the agreement.

It is wise to have a lawyer draw up or examine the contract and record it. The Service Forester can help you prepare the agreement which will best suit your needs.

Marketing Suggestions:

1. Refer to your management plan when selecting timber to sell.
2. Before selling the timber, determine by actual measurement the amount and approximate value of the timber.
3. Sell directly to the user whenever possible. This gives you the middle man's profit.

4. Interest as many buyers as possible in the timber offered for sale. Advertise if necessary. Competition in buying usually results in greater returns to the seller.
5. Always make sure that the buyer is reputable. Ask for references.
6. Never cut timber until a definite market is located.
7. If possible, use your own equipment and labor.
8. Always have a written Sale Agreeppment.
9. Avoid selling timber during market depressions. Standing green timber does not deteriorate rapidly nor do the uses of wood change greatly within a few years.
10. Never sell young, fast-growing timber. Its value increases each year.

HAZARD REDUCTION

The State Law requires that, before cutting, the contractor must enter into a hazard reduction agreement with the State. Under this Law, the original purchaser of forest products will withhold a set fee per thousand board feet, or its equivalent, for the reduction or management of the fire hazard created. Purchasers withholding slash fees are required to report and send slash payments to the State each month. This deposit is held by the State until the hazard is reduced or managed in accordance with the prescription contained in the hazard reduction agreement. It is then returned to the contractor less administration fees.

If you do your own timber cutting, you are the contractor and it is recommended that you reduce the hazard yourself. If you sell your timber as stumpage you should make sure that the contractor has entered into a "Hazard Reduction Agreement" and has made arrangements for payment of the fee. If your payment for stumpage is made by a mill, be sure that the fee is not withheld from your payment, unless you have agreed to this.

The Service Forester can give you more details of the Hazard Reduction Law and give you advice on proper hazard reduction or management. The fee set is not meant to cover total slash disposal. If total disposal is desired by the land owner it should be specified in the timber sale contract.

LOGGING

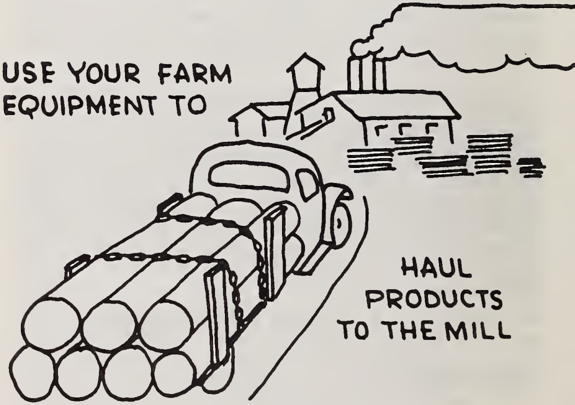
You should plan logging operations well in advance of timber cutting. Truck and skid roads should be located to best log the area. Consideration should be given to future cutting as well as present. Roads should be planned so that skidding distance will not exceed 1,000 feet. Generally grades should not exceed 8% on roads and 15% on skid trails.

You should install adequate drainage structures such as culverts and ditches on all roads which may become subject to erosion. Out-sloping the road bed may be used in some areas. Cross ditches or rolls should be installed on roads or skid trails which will not be used again in the near future.

Trees should be felled toward skid roads wherever possible. This will facilitate skidding and reduce damage to leave trees. Timber should not be felled into areas of heavy reproduction.

Generally trees are bucked into logs which are multiples of 16 feet with a 6 inch trim allowance for each 16 foot log. Check with your purchaser to ascertain his requirements. When it is necessary to make odd length logs they should be taken from the top end of the tree. The Service Forester can show you how to detect cull material and defect in the log and how to cut it out to your best advantage.

SKIDDING CAN OFTEN BE DONE WITH YOUR FARM TRACTOR


USE YOUR FARM EQUIPMENT TO
HAUL PRODUCTS TO THE MILL

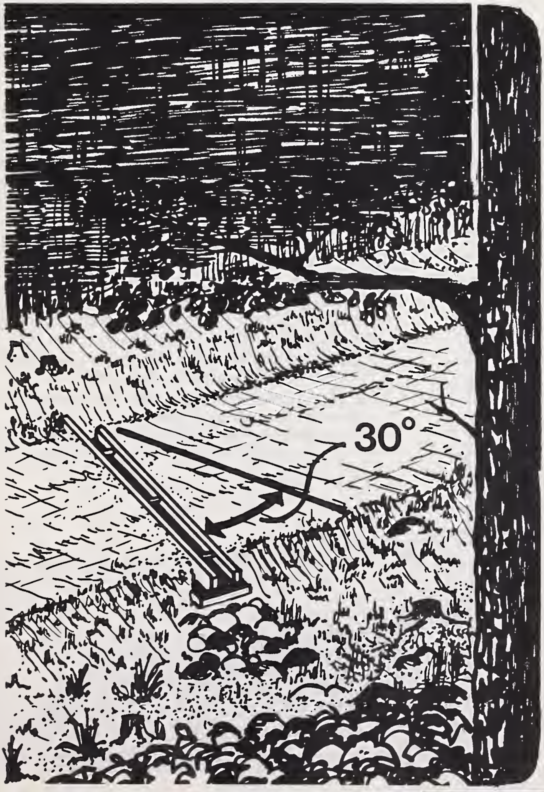
Skidding should always be done to cause the least amount of damage to the leave stand. Proper felling can reduce skidding costs and reduce waste from breakage. Avoid skidding down the bed of dry gullies or live stream channels. This will cause erosion and damage to the forest and agricultural lands below.

Logging is one of the most dangerous occupations in Montana. Always wear safety equipment such as "hard hat" and boots. Beware of leaning trees and limbs lodged in trees. They are "Widow Makers."

HOW TO INSTALL AN OPEN TOP CULVERT

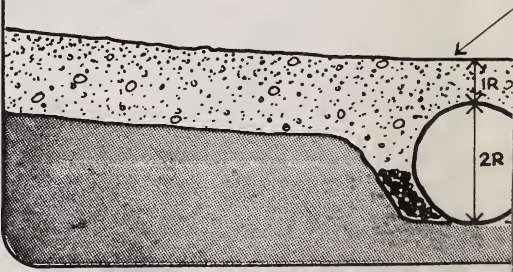
- Install the culvert at a 30 degree angle downslope
- Let the open outlet end extend beyond the road surface and place a broad apron of rocks or logs under it to spread the flow of water and trap sediment
- Let the inlet end extend into the cut slope or ditch
- Space culverts on long slopes at regular intervals:

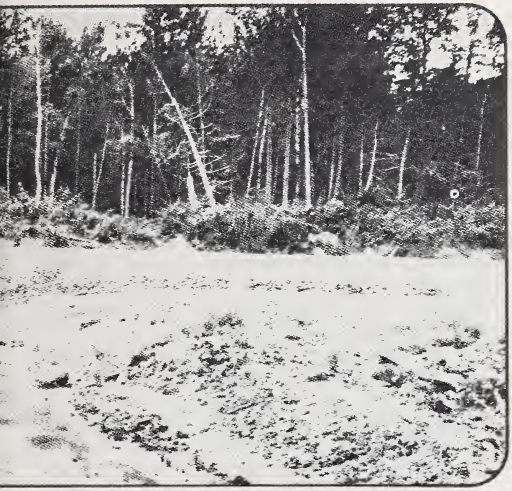
	EROSIVITY	
Grade	Low	High
3%	----	1070'
4%	----	800'
5%	1200'	640'
6%	1010'	535'
8%	755'	400'
10%	605'	320'



HOW TO INSTALL A CULVERT IN A STREAM BED

- Locate your road and culvert so that the road crosses the stream channel at right angles; select a location that has firm banks and fairly level approaches.
- Select a culvert that is large enough to handle at least a 10 year frequency peak runoff.*
- Install the culvert so that:
  - the bottom is at or a little below the stream bed
  - earth or gravel is tamped around at least half of the culvert for its full length
  - the dirt covering the culvert is as deep as half the culvert diameter (see sketch)
  - both ends extend a foot beyond the toe of the fill over the culverts and
  - the upstream end of the fill around the culvert is protected from erosion with rocks, logs, or by seeding.

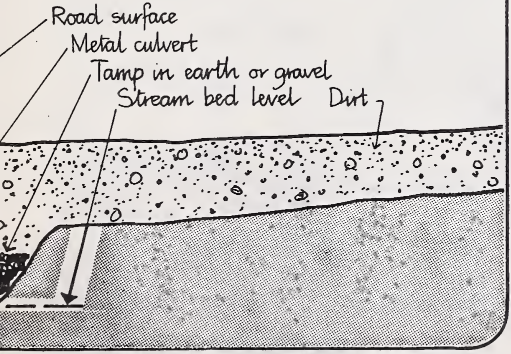




NOTE:

If the road over the culvert is not used for 3 or more years, and the culvert is not large enough to handle a 25 year frequency storm*, the culvert should be removed. The banks should then be cleaned up, seeded, or otherwise stabilized.

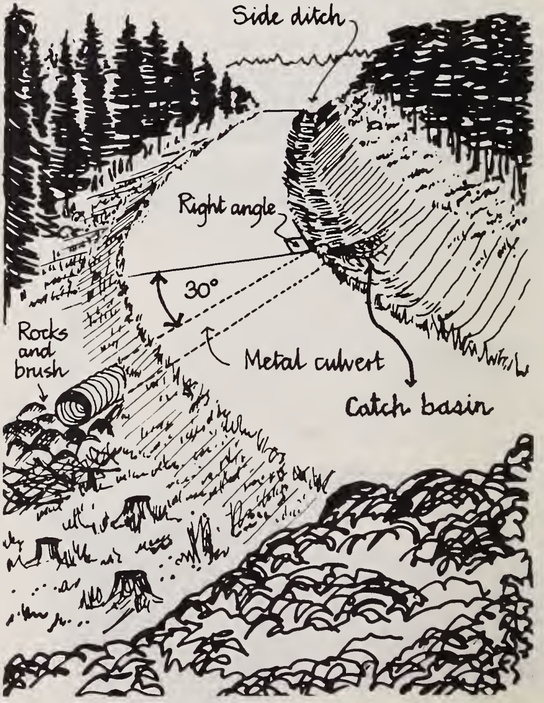
*Contact your Service Forester, or Soil Conservation service for information on peak stream flows and culvert sizing.



HOW TO INSTALL A CROSS DRAINAGE CULVERT UNDER A HAUL ROAD

- Determine where the cross drainage is needed after shaping the haul road
- Install the culvert at a 30 degree angle downslope
- Place the culvert at least 12 inches below grade and allow it to slope on natural grade
- Extend inlet end into the side ditch to intercept water flowing in the ditch
- Extend the outlet end beyond any fill, and empty onto an apron of rock, gravel, brush or logs
- Space the culverts according to the road grade & erosivity.

	EROSIVITY	
Grade	Low	High
3%	----	1070'
4%	----	800'
5%	1200'	640'
6%	1010'	535'
8%	755'	400'
10%	605'	320'



INSECTS AND DISEASE

Tree killing insects and diseases take a heavy toll of timber in Montana each year. It is of primary importance that you learn to recognize the symptoms of an insect infestation in your stand and when your trees have a fungus infection.

Bark beetles are apt to make an appearance after a logging or thinning operation. They often attack slash first and then spread to standing trees. The presence of beetles can be recognized by small mounds of light brown dust in bark crevices near the butt of the tree. When this occurs in large amounts around the entire tree you can expect it to die. Beetles generally attack the trees in early spring and by fall or early winter the crown shows up as a red top. These trees should be removed as soon as possible so that the infestation will not spread to other trees. Slash from logging or thinning should be treated as rapidly as possible to eliminate beetle breeding habitat.

Defoliating insects seldom cause tree mortality unless present in great numbers for several successive years. However, they do reduce the crown density with resultant loss of growth and ability to produce seed. Control of epidemic outbreaks of this type of insect may be undertaken by the State. You will be notified if lands under your control fall within a zone of infestation.

Mistletoe is a parasitic infection which reduces tree growth and produces deformed branches and boles. It occurs on Douglas fir, larch, lodgepole pine, and spruce in Montana. Mistletoe is typified by heavy dense needle clusters and increased small limb growth which occurs in broom-like formations throughout the tree. Control is geneally through logging in merchantable size trees. Infected trees under merchantable size should also be removed to prevent spread to seedlings and saplings.

Fungus diseases of trees show their presence in several ways. Generally the most detectable is the formation of the fruiting body or "conk" on the tree bole. Small swellings on the trunk may show rot when the outer bark is removed. Rot is also detected by discoloration and softening or breakdown of the wood tissue. The action of fungi or rot is slow; however, they can reduce the total growth of the stand and spread to healthy trees nearby.

Diseased trees are often an invitation to attack by bark beetles and other insects. Control is generally by removal of the affected tree.

When any symptoms of insects and disease appear in your stand you should contact the Service Forester to help you survey the damage and plan control measures.

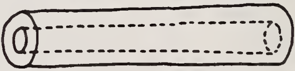
SCALING

Lumber and timber are generally sold by the thousand board feet. You should have a reasonably accurate measure of your timber before a sale is made. This will help you determine the value you should receive from the timber and help the purchaser determine the bid price.

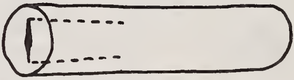
Scaling is the determination of the net board feet content of a log or tree. This determination involves proper allowance for taper and deduction for defect which may affect the gross volume. Deductions include ring shake, heart check, rot and sweep. Net log scaling by qualified people is most desirable.

The Scribner Decimal C Scale rule or volume table is in standard use in Montana and should be used in any volume estimating work you do. It can be used to obtain the volume of standing trees as well as sawn logs. The Service Forester can help you determine volumes and show you how to apply proper scaling procedures to obtain given volumes.

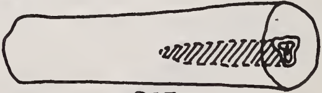
FOUR OF THE COMMON DEFECTS FOR WHICH DEDUCTIONS ARE MADE IN SCALING



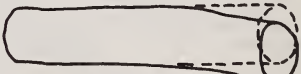
RING SHAKE (SEPARATION BETWEEN ANNUAL RINGS)



HEART CHECK (A "CRACK" IN THE HEART WOOD)



ROT



SWEEP

RECOMMENDATIONS

USEFUL INFORMATION

Link	0.66 feet
Rod	25 links or 16.5 feet
Chain	100 links or 66 feet
Mile	80 chains

Spacing	Trees per Acre	Spacing	Trees per Acre
4 x 4	2,723	11 x 11	360
6 x 6	1,210	12 x 12	302
8 x 8	680	13 x 13	257
9 x 9	537	14 x 14	222
10 x 10	435		

Cord (Stacked)	4 x 4 x 8 ft.
Board ft.	12" x 12" x 1 inch
Board ft. (green)	9-12 lbs.
Fence posts	6½-8 ft.
Corral rails	8-16 ft.
Barn poles	16 feet up
Telephone and power poles	20 feet up

Product	Principal Species
Fence posts	Lodgepole Pine, D-Fir
Poles	Lodgepole Pine, Larch
Sawlogs	All Montana Species
Veneer	Larch, Douglas Fir
Christmas Trees	Douglas and White Fir
Pulpwood Chips	Pines, Larch, Fir, Spruce
Firewood	Larch, Fir, Cottonwood

Abbreviations

WP	White Pine
PP	Ponderosa Pine
Lar	Larch
D.F.	Douglas Fir
W.F.	White Fir
Ced.	Cedar
Sp	Spruce
LpP	Lodgepole Pine
Bd. Ft.	Board Foot
Ch	Chain
Mi	Mile
Ac	Acre
M bd. ft	Thousand Board Feet
DBH	Diameter Breast High
DBH	Diameter 4½ feet above ground

RECOMMENDATIONS

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